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Spaceport News

John F. Kennedy Space Center - America's gateway to the universe

Inside . . .

Small business' role as important as ever

By Steven Siceloff
Spaceport News

Small businesses have a role to play in NASA's future as inventors and producers, the agency's acting Chief Technologist told an audience at Kennedy Space Center in Florida on Sept. 23.

"Every day, people are helped by NASA technology," Joe Parrish said. "We serve a crew of six billion."

Parrish, the deputy Chief Technologist, currently is leading the Office of the Chief Technologist.

He said the Small Business Innovative Research, or SBIR, and Small Business Technology Transfer, or STTR, Programs provide an opportunity for small, high technology companies and research institutions to participate in government-sponsored research and development efforts in key technology areas that would be useful to NASA, or to commercialize existing ideas that can be sold to the public.

Each of NASA's Mission Directorates provide chances for innovation, said NASA's Rich Leshner, the SBIR and STTR program executive at NASA Headquarters. For example, new rockets and spacecraft are expected to need different ground support equipment at Kennedy.

About two-thirds of the small businesses involved in the NASA programs employ fewer than 25 people.

As NASA identifies technologies it would like to see developed, SBIR and STTR are set up to award contracts in phases for feasibility studies, then prototypes and full development. Leshner said the ultimate payoff for the program is when a technology is used for a flight, mission or instrument.

The International Space Station is a particularly fertile ground for innovation since it is a national laboratory, said Jim Stegeman of Glenn Research Center in Ohio. The agency is looking for innovations that aid research on the station and technology that can be incorporated into the CubeSat studies. The program also is on the lookout for advances in laser optical communications, Stegeman said.

Each mission directorate has research areas where they are soliciting new innovative approaches. The agency's Science Mission Directorate, for instance, is looking for improvements in mirror technology and spacecraft subsystems, things that can be built into a probe to aid in navigation and guidance using machinery that is lighter than current designs. Parminder Ghuman of NASA's Goddard Space Flight Center also pointed to high altitude balloons and sounding rockets as platforms for small-scale innovators. Dr. Tony Strazisar, Senior Technical Advisor for the Aeronautics Research Mission Directorate, stressed the importance of the SBIR Program as a viable source for their Technology Portfolio and that about 30 percent of the proposals that recently arrived in response to this year's solicitation were directly linked to Aeronautics Research.

Parrish said that combined with the technology developments the agency is conducting itself, small businesses are contributors of the advances that will make future science and exploration successful.

NASA file/2010

There are opportunities for innovation in ground support equipment as Kennedy Space Center outfits its facilities to host several different kinds of rockets. New designs are evaluated at Kennedy Launch Equipment Test Facility which recently underwent a major upgrade.

> *"Every day, people are helped by NASA technology. We serve a crew of six billion."*
>
> **Joe Parrish,**
> **NASA's**
> **Acting Chief Technologist**

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Development of alternate ground launch systems gets boost

By Linda Herridge
Spaceport News

A non-reimbursable Umbrella Space Act Agreement (SAA), signed recently between Kennedy Space Center Director Bob Cabana and KT Engineering in Madison, Ala., will help the agency acquire the knowledge necessary to develop a multi-user ground system architecture for launching nontraditional, low-cost vehicles. The agreement is valid for five years.

"Kennedy Space Center's role as a traditional one-system launch complex is transforming to become a true spaceport supporting multiple users," Cabana said. "And we are moving forward, changing the ways we do business with commercial space customers."

Technical Integration Manager Cliff Hausmann, with Kennedy's Center Planning and Development Office, said within the first year of SAA's implementation, KT Engineering is tasked with sharing information related to launch system design, ground processing flow and universal umbilical concept design. This also includes information related to the company's development of the Radially Segmented Launch Vehicle (RSLV) Processing Data and Multi-User Ground Architecture Concept of Operations Development.

Photo courtesy of KT Engineering/Media Fusion

An artist's rendering of the launch of a Radially Segmented Launch Vehicle from Kennedy Space Center.

Partnership Development Manager Robyn Mitchell, also with Kennedy's Center Planning and Development Office, explained non-reimbursable agreements are more about knowledge and information sharing and concept development, with no payback obligations.

One of these low-cost vehicles possibly being developed is the RSLV that has the potential to be processed and launched from Kennedy, according to KT Engineering's Chief Operating Officer Bob Mellor.

"It's an exciting time because RSLV is a different type of vehicle that offers a low-cost, modular design that could significantly reduce the cost for transporting payloads to orbit," Hausmann said. "Under this agreement the center will be able to expand its support to a wider range of launch vehicles and develop a multi-user architecture through the 21st Century Ground Systems Program managed here at Kennedy."

Mellor said this SAA takes a critical step forward in enabling them to tap into Kennedy's vast knowledge and unparalleled expertise in ground processing and launch operations, while providing NASA, the Department of Defense and commercial users with a revolutionary, low cost, launch option.

"We believe that Kennedy offers a viable launch site option for consideration in the company's future business planning," Mellor said. "The RSLV is unique in that it is designed to leverage manufacturing economies of scale not often seen in the space launch business, therefore minimizing costs."

Mellor further noted, unlike the space shuttle, the RSLV is an unmanned system and will be integrated and transported horizontally to the launch pad, much like the Russian systems.

Several Kennedy directorates and offices, including Engineering, 21st Century Ground Systems Program, and Ground Processing, will provide engineering support to deliver a Concept of Operations and also provide conceptual design and capability specifications for universal vehicle-to-pad interfaces.

"The efforts put into this agreement will validate the center's ability to effectively accommodate a wide variety of commercial launch vehicle provider needs which further supports the transformation of Kennedy into a multi-user spaceport," Mitchell said.

Tour de KSC kicks off 2011 Combined Federal Campaign

Bicycling enthusiasts may tour the Kennedy Space Center on their bikes Oct. 15 to kick off this year's annual Combined Federal Campaign.

This year's signature event will include a stop at the Vehicle Assembly Building (VAB) with an opportunity to walk into the VAB and view space shuttle Endeavor, temporarily stored in High Bay 4.

Tickets are $25 ($15 of which is be considered a one-time, charitable donation to the Combined Federal Campaign (CFC). It includes a T-shirt, food, and refreshments. Registration begins at 7 a.m. and the ride is from at 8 a.m. to noon. Badged employees may purchase tickets for up to five guests.

For more information, go to **http://tourdeksc.ksc.nasa.gov/index.htm**

CLICK ON PHOTO *NASA/Jim Grossmann*

Chairman for 2011 Combined Federal Campaign Yves Lamothe, between Kennedy Space Center Deputy Director Janet Petro and Center Director Bob Cabana, poses for a photograph with the 2011 Combined Federal Campaign cabinet members on Sept. 19. For more on the 2011 Tour de KSC, click on the photo.

Launch Pad 39B ready for next generation

By Steven Siceloff
Spaceport News

CLICK ON PHOTO *NASA/Jim Grossmann*

The deconstruction of Launch Pad 39B at Kennedy Space Center is complete. Still remaining is the flame trench. Launch Pad 39A can be seen in the distance. In 2009, the structure at the pad was no longer needed for NASA's Space Shuttle Program, so it is being restructured for future use. For information on NASA's future plans, click on the photo.

Launch Pad 39B at NASA's Kennedy Space Center in Florida recently made way for a new generation of rockets when workers took down the gantry that stood in support of space shuttles for 30 years and replaced it with, well, not much really.

But that was the idea.

Whatever rocket heads out to the pad in the future, it's going to bring its support structure with it. With that in mind, Pad B will provide all the fluids, electrical, and communications services to the launch platform.

"This is progress," said Regina Spellman, deputy project manager for the pad's makeover.

NASA decided to use the Mobile Launcher (ML), to carry the new Space Launch System rocket to the pad, and use one of the Mobile Launcher Platform (MLP) for commercial vehicles, Spellman said that "all Pad systems are being designed to support both the ML and the MLP."

Construction will start soon to build two electric elevators at the pad to replace the aged one there now. The new ones will be sized to reach all levels of the ML, which is being used as the platform that carries the new Space Launch System rocket to the pad, and the MLP. The MLP will be used for any commercial rocket that will be interested to fly from the Pad B.

"Pretty much everything that's staying is for access to the ML and the MLP," Spellman said. "What we're trying to do is not preclude a mobile launcher or mobile launcher platform because there are a number of scenarios with commercial companies possibly using the MLP. With anything we do, we want to make it so you can still use the Pad with an ML or MLP."

Along with the dramatic changes on top of the pad that removed the shuttle structures, there is a considerable amount of refurbishment under way inside the launch pad perimeter.

A million feet of cables already have been removed, as have the storage tanks for hypergolic fuels, the corrosive chemicals that powered the shuttle's thrusters in space. Instrumentation that monitors and controls the facility and ground systems as well as the communications systems have been replaced with new state-of-the-art equipment. A new weather instrumentation system has been installed at the pad that monitors meteorological conditions and detects lightning.

CLICK ON PHOTO *NASA/Jim Grossmann*

The new design will feature a "clean pad" for rockets to come with their own launcher, making it more versatile for a number of vehicles. For more about the history on the launch pads, click on the photo.

"We are also going to spend a large amount of funds upgrading the existing infrastructure" said Regina.

Chipped and damaged concrete pedestals supporting propellant lines running from storage tanks to the pad's surface are being fixed and sealed to handle at least 25 more years beside the ocean.

The huge white spheres that held liquid hydrogen and liquid oxygen have been emptied, too. They will be repainted, but not taken down. The old liquid oxygen water-cooled vaporizer will be replaced with modern, air-cooled one that is far more efficient than the water-cooled system used the past 30 years.

The reworking of the pad began while the shuttle fleet was still active. Three large lightning towers, each taller than the Vehicle Assembly Building, were completed in time for the shuttle Endeavour to be positioned on the pad as a backup for Atlantis ahead of the STS-125 mission to NASA's Hubble Space Telescope.

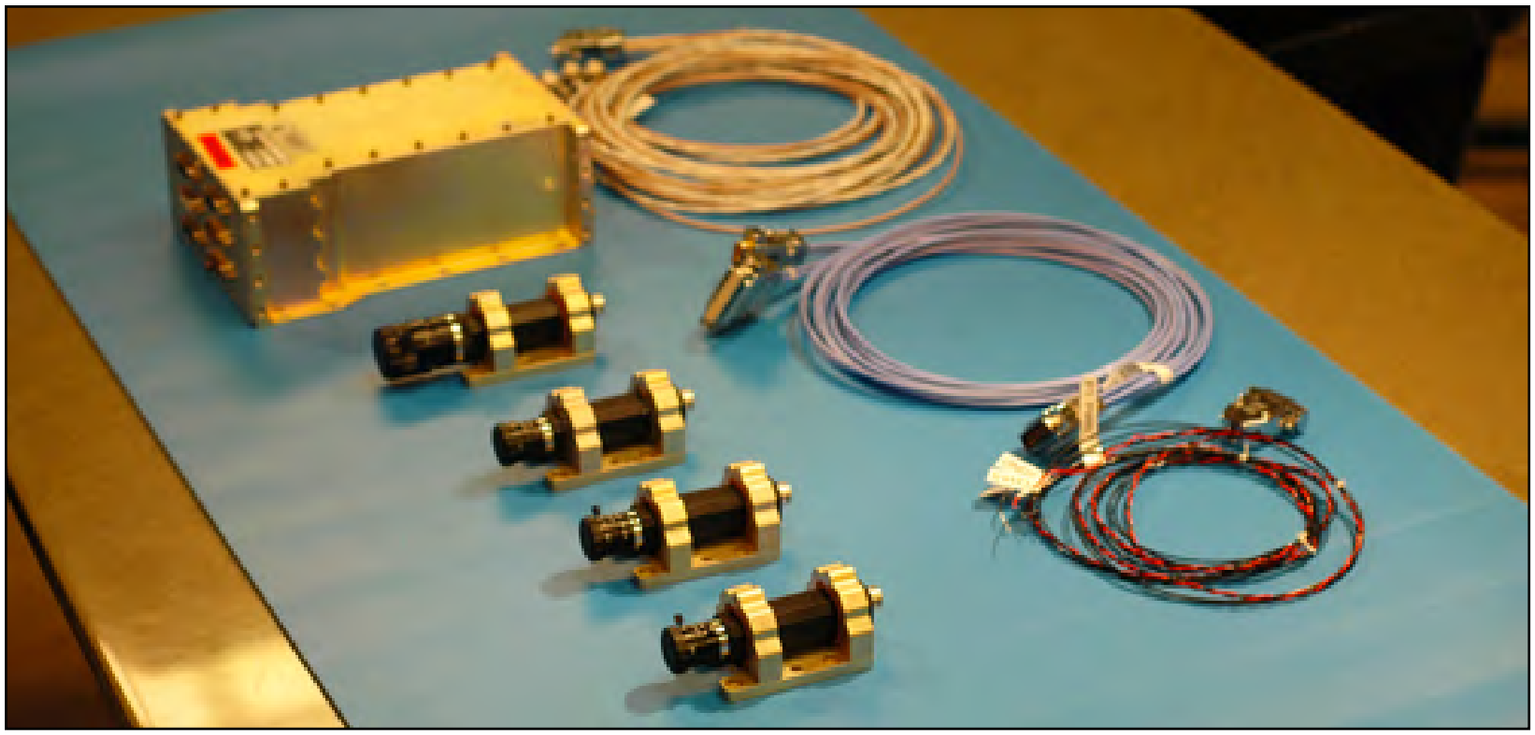
Pad B was the starting line for the astronauts of Apollo 10 and on the Apollo-Soyuz Test Project mission before it hosted space shuttle liftoffs and then the Ares I-X flight test on Oct. 28, 2009.

The flame trench, lined with fireproof bricks and concrete, also will see significant changes. For one, the flame deflector, which is the pyramid in the middle of the trench, may need to be moveable, as it was during Apollo. That's because the launch pad is to be set up to serve different rockets, and each one needs a different flame deflector arrangement.

The flame deflector splits the exhaust from the rocket into different directions of the flame trench. The water that is dumped into it at liftoff keeps sound waves from reverberating directly back on the rocket.

"I think the flame deflector's going to be our biggest challenge if we have to make it moveable," Spellman said.

While Pad B undergoes its extensive work, its twin, Pad A, will be put into a mothball state, the pad may be reactivated if a commercial company decides to launch from it.



For NASA

The MoonKAM system contains a digital video controller and four camera heads. This system can be used to take images or video of the lunar surface with a frame rate up to 30 frames per second. The system is provided by Ecliptic Enterprises Corporation, Pasadena, Calif.

Classrooms to become mini mission control centers

By Melanie Carlson
Spaceport News

NASA will give students unprecedented control over a powerful camera that is on its way to the moon now aboard a spacecraft launched last month. In a program led by Sally Ride, America's first female astronaut in space, middle and high school students are picking targets on the moon to photograph and study. Students from several local Brevard County schools will participate in this unique learning opportunity made possible with the launching of MoonKAM, a payload on NASA's twin Gravity Recovery and Interior Laboratory (GRAIL) mission. GRAIL launched Sept. 10 at Launch Complex 17B on Cape Canaveral Air Force Station.

GRAIL MoonKAM (Moon Knowledge Acquired by Middle school students) is GRAIL's signature education and public outreach program.

The twin GRAIL probes, each about the size of a washing machine, will take a slow, fuel-efficient path to the moon. The first spacecraft will arrive on Dec. 31 and the second on New Year's Day 2012. The twin probes will fly in formation above the lunar surface at an altitude of 34 miles. As the GRAIL satellites orbit the moon gathering scientific data, each MoonKAM system (one per spacecraft), consisting of a digital video controller and four camera heads, will be used to take images of the lunar surface. The MoonKAM mission is expected to last 82 days.

MoonKAM is modeled on Sally Ride Science's successful EarthKAM (Earth Knowledge Acquired by Middle school students) mission, a NASA-sponsored education program. Formerly known as KidSat, the program began in 1996 with camera systems that enabled middle school students to photograph targets for Earth science studies. EarthKAM has flown on several space shuttle flights, the first being in 1996 aboard space shuttle Atlantis (STS-76). More than 300 photos were taken during the mission. The EarthKAM camera was installed on the International Space Station during mission STS-98, part of Expedition One in February 2001 and still is in use.

Beginning in March, teachers and students can set up mini-mission control centers in their classrooms for two- to four-day space exploration operations. Throughout that time, students go to an interactive MoonKAM website where they can track the orbits of the GRAIL spacecraft. Clickable topographic maps show what regions and surface features the spacecraft will be flying over. Students then select targets, gather precise latitude and longitude information, express their scientific interests and objectives, and submit their requests to undergraduate students at UCSD running the Mission Operations Center. NASA Jet Propulsion Laboratory then will carry out the request.

Students from Cocoa High School, Space Coast Jr./Sr. High School and Rockledge High School began their moon mission on Sept. 10 by viewing the launch of the GRAIL mission at Kennedy Space Center and will be following the lunar mission throughout the school year. Also participating in this science endeavor is St. Charles Borromea Catholic School in Port Charlotte, Fla.

"The entire concept is to inspire and encourage these science students to continue their education into STEM studies," said NASA's Beth Smith, Kennedy's Education Program Specialist.

Moonkam also may strengthen students understanding of science and inspire the next generation of explorers.

Desert RATS take on challenges of asteroid missions

By Steven Siceloff
Spaceport News

As far as challenges are concerned, going to an asteroid comes with all the standards for a space destination such as no air, lags in communication with Earth and the radiation risks that come with being in space.

Compared with going to the moon or Mars, though, asteroids demand explorers consider another significant factor: there's virtually no gravity. The astronauts that bounded enthusiastically on the moon might have bounced themselves right off into space if they had been on an asteroid instead.

Finding the best combination of equipment and number of astronauts to deal with communications challenges while surveying an asteroid was one of the goals of this year's trip to Arizona for research known by its acronym, D-RATS, short for Desert Research and Technology Studies.

"Each day we went out with a different architecture," said Marc Seibert, who leads a variety of communication and navigation systems projects with Kennedy's D-RATS contingent. The designs are intended to operate in any space environment.

The explorers used backpacks developed at Kennedy equipped with cameras and space versions of the tools of the modern communications world. The backpacks were developed as a mobile office for the explorer. They made their first field tests during last year's D-RATS.

Previous years have seen the desert stand in as the moon or Martian surface, but this year's effort was the first to prep for an asteroid.

"We're trying to build this as a framework to go to multiple destinations," said Tracy Gill, an engineer at NASA's Kennedy Space Center who works on the D-RATS projects.

NASA

Two rovers with the Habitat Demonstration Unit during recent field tests in Arizona.

Several NASA centers take part in the exercise providing specific programs and tools. Astronauts make the desert excursions which basically experiment in different scenarios to find out, for example, how many people should go on a mission to an asteroid, how many are needed to explore on the surface and what are the best ways to actually conduct the research.

From trying out a Robonaut assistant to placing handrails on the asteroid's surface, researchers set out to formulate the best methods, tools and needs for the work.

To simulate the communications environment, the network was programmed with a 50-second delay in communication between the astronauts and the actual mission control in Houston. With the time delay on a representative asteroid mission, voice communication between Earth and an exploration team could be complicated during critical operations, so "We have a text messaging tool so it's not blaring in their ears," Gill said.

The delay is critical to show researchers when automated processes should be developed and to train astronauts what to expect when they are waiting for guidance from Earth for certain steps or unexpected circumstances.

The researchers brought with them mockups of a rover and living quarters very much like the ones that would be taken into space. A Robonaut mounted on a rover chassis came along too.

"This whole architecture would go to the destination," Gill said.

The rover, or Space Exploration Vehicle (SEV), is being designed with numerous settings in mind, Seibert said, so considering it in an asteroid environment was useful for fine-tuning its design.

For example, a rover would need wheels on the moon, but those might be useless on an asteroid, where a small bump at high speed would send the rover off the surface and into space. So maybe a set of automated thrusters or a cable and anchor that allow station-keeping would be more valuable, for instance.

Seibert said the group proved that steering the vehicle and conducting science at the same time requires two people in the vehicle rather than counting on one person to do both.

Additionally, this year's Desert RATS saw the first prototype version of a Deep Space Habitat (DSH) which can be configured for microgravity of surface exploration missions. The Deep Space Habitat contains work stations to support the astronaut's science and maintenance activities on an exploration mission and habitation systems for long term space flight. The DSH has significant contributions from Kennedy ranging from systems such as a deployable work platform to technology demonstrations, such as dust mitigation and damage detection systems.

NASA recently made asteroid studies a priority. The Dawn mission to two of the largest asteroids in the solar system, Vesta and Ceres, is one example. A future mission called Osiris-Rex is to bring back pieces of an asteroid in 2016. Previously the NEAR spacecraft landed on the asteroid Eros in 2001 as it orbited 196 million miles from Earth, more than seven times farther away than the moon.

The D-RATS scientists typically publish about two dozen scientific papers detailing their findings after each mission.

The next steps in the evolution are not destined for the desert, but rather the sea floor. To work in an environment replicating the lack of gravity better, researchers plan to use NASA's Extreme Environment Mission Operations base in the Florida Keys known as NEEMO to work with the space exploration vehicle. In the ocean, the SEV mockup will be able to float near the ocean floor and work near an astronaut outside the vehicle in much the way it would around an asteroid.

Next year, the D-RATS are to become Lab RATS instead, Seibert said, working with a specialized air-floor at NASA's Johnson Space Center in Houston to simulate the gravity field.

Seibert said, "It's an evolutionary process, for sure."

NASA image

An artist rendition of the in-space habitat with crew transportation and space exploration vehicles during a near Earth asteroid mission.

Last shuttle crew shares mission experiences with workers

By Linda Herridge
Spaceport News

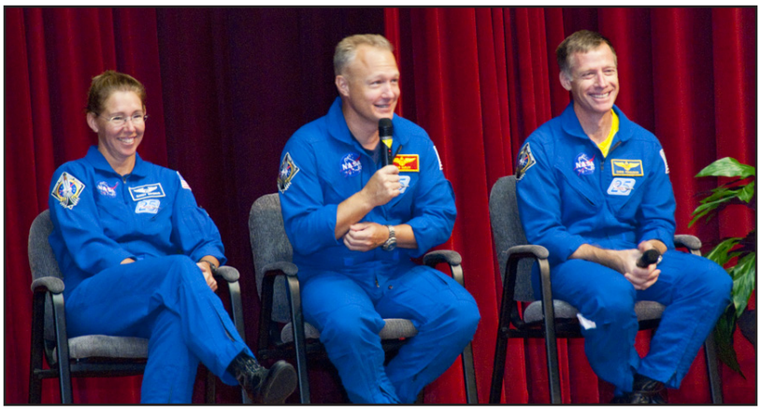
A homecoming in one way or another seemed to be on the minds of the crew members of the STS-135 mission when they returned to Kennedy Space Center to share their experiences and an overview of the final shuttle flight. Commander Chris Ferguson, Pilot Doug Hurley and Mission Specialist Sandy Magnus spoke to a standing room only audience, Sept. 15, in the Headquarters Training Auditorium.

Kennedy Center Director Bob Cabana said that of all the crews that could have flown on the last space shuttle mission for the U.S., he couldn't think of a finer crew than this one.

"They have been remarkable in their willingness to give after coming back off that mission to spend time and talk with everyone," Cabana said. "This is a special group."

Fourth crew member, Mission Specialist Rex Walheim, was unable to attend due to an obligation out of the country.

"It's great to be back here. Kennedy Space Center is kind of my home away from home," Hurley said. "I spent a lot of time here in the first few years after I was selected (as a NASA astronaut)."



CLICK ON PHOTO NASA/Jim Grossmann

Astronauts from space shuttle Atlantis' STS-135 mission return to the Training Auditorium at NASA's Kennedy Space Center for the traditional post-flight crew return presentation on Sept. 19. Pilot Doug Hurley shares a personal story about his experiences. With him are (on left) Mission Specialist Sandra Magnus and (on right) Commander Chris Ferguson. STS-135 Mission Specialist Rex Walheim was unable to attend the Kennedy event. STS-135 was the 33rd and final flight for Atlantis and the final mission of the Space Shuttle Program. For more on the STS-135 mission, click on the photo.

Commander Ferguson said two things struck him after the mission. First, how good the Kennedy work force has become at launching space shuttles, and second, seeing a picture of the number of people on the Titusville Bridge that had gathered to view the launch of Atlantis.

Ferguson said they went back and looked at some photographs taken that day from a helicopter and found no less than a dozen places that looked exactly like the crowds on the Titusville Bridge.

"It showed just how much, in this day and age, I really think, that the nation just stopped and reflected a little bit on what the space shuttle has meant to the space program and to this country," Ferguson said.

Magnus said that the hardest thing for her during the STS-135 mission was leaving the space station. She served as an Expedition crew member from November 2008 through March 2009.

"Pictures don't do it justice," Magnus said. "The space station is such an amazing, magical place. To live in this building that is orbiting around the Earth is so special.

"When we docked to the space station and opened the hatch I really felt like I was coming home. It felt the same, it smelled the same. It was just amazing how much it had not changed even though there were extra modules that had been added," Magnus said. "We could not have put the station together without the space shuttle."

During the STS-135 mission, Walheim coordinated the spacewalks that were performed by two of the Expedition crew members. Magnus coordinated the transfer of supplies and equipment from the multi-purpose logistics module to the station. Hurley operated the shuttle's robotic arm during the transfer of the logistics module from the payload bay to the station and back again.

Among the many items carried on the last shuttle mission, was a flag from the first mission, STS-1. During the STS-135 mission, the crew members left the flag on the space station's node 2 forward hatch.

"The idea is that the next U.S. crew to get there will bring the flag back," Ferguson said.

ALTA pods vital in getting Enterprise to New York

By Steven Siceloff
Spaceport News

Teams at NASA's Kennedy Space Center in Florida continue practicing rarely performed techniques for moving space shuttles among some of the nation's premier museums as next year's shuttle shuffle nears.

The latest rehearsal saw shuttle Endeavour fitted with the inoperative orbital maneuvering system pods that the prototype shuttle Enterprise used during its approach and landing tests in 1977.

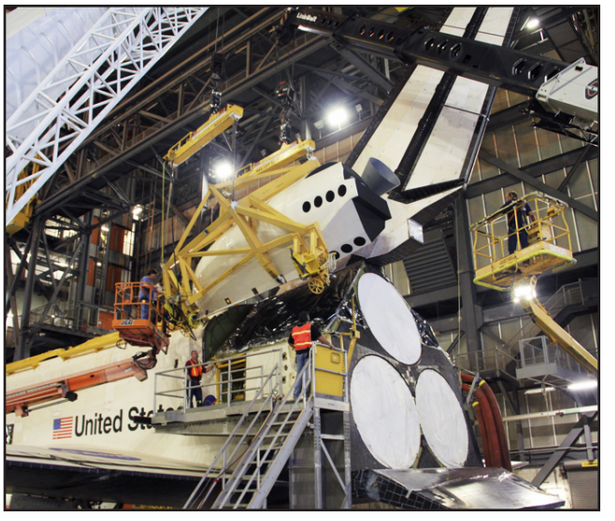
Housed temporarily inside High Bay 4 inside Kennedy's mammoth Vehicle Assembly Building, or VAB, Endeavour was the focus of a pair of heavy cranes and operators for the run through.

The mockup pods, known as ALTA pods for Approach and Landing Test Assembly, will be fitted again on Enterprise so it can be taken safely by airplane from its current display at the National Air and Space Museum's Udvar-Hazy Center outside Washington, D.C., to the Intrepid Air and Space Museum in New York City. The pods currently on Enterprise are wooden replicas that are not strong enough for flight.

By testing them on Endeavour first, Kennedy workers learned what to expect when they do it inside the confines of the Smithsonian museum.

"We spent a lot of time mocking up the Vehicle Assembly Building to create the same floor plan layout we will be working in at the Udvar-Hazy Center," said Bart Pannullo, the vehicle manager for the shuttle's transition and retirement. "This allowed us to be sure all the equipment we were using would fit and function

See **ALTA**, Page 8



CLICK ON PHOTO NASA/Jim Grossmann

Workers lower the cage containing an Approach and Landing Test Assembly (ALTA) pod over the rear of space shuttle Endeavour in the Vehicle Assembly Building at Kennedy Space Center on Sept 22. For more on space shuttle transition and retirement, click on the photo.

Remembering Our Heritage

Shuttle, station 'work horses' decommissioned

By Kay Grinter
Reference Librarian

NASA/Jim Grossmann

Payload canister No. 1, traveling from the Canister Rotation Facility in the center's Industrial Area to the Reutilization, Recycling and Marketing Facility on Ransom Road on Sept. 27, is forced to take a circuitous route toward the Vehicle Assembly Building, in the background, to avoid obstacles along the way at Kennedy Space Center. The two payload canisters used to transport space shuttle payloads to the launch pad for installation in the shuttles' cargo bays are being decommissioned following the end of the Space Shuttle Program. For more information on the canisters, click on the photo.

NASA's payload canisters have completed their final move this week, a journey from Kennedy Space Center's Canister Rotation Facility, or CRF, to the Reutilization, Recycling and Marketing Facility on Ransom Road.

The canisters -- used to transport all space shuttle payloads requiring vertical installation into the shuttles' cargo bays to the launch pads -- are being decommissioned.

Canister No. 1 was delivered to Ransom Road on Sept. 27, followed by canister No. 2 on Sept. 28.

Skip Swaney, NASA's integrated disposition team project lead, oversaw the operation.

"The move was delayed one day because of weather," Swaney said. "Liz Boyd recommended that we wait."

Boyd, multi-mission support equipment engineer for the Boeing Co., was responsible for the welfare of the canisters in the CRF, where they are held when not in use and experienced planning canister moves.

"This was not the canisters' first trip to Ransom Road," Boyd said. "They went there about 10 years ago to be painted."

Each canister weighs 110,000 pounds and is 65 feet long, 22 feet wide, and 18 feet, 7 inches high. Moving them requires a bevy of support vehicles and monopolizes two lanes of any roadway.

Canister No. 1 was built in 1978 and Canister No. 2 was built around 1984.

"This move required that the canisters turn around twice," Boyd said, "since sensors added to the lights near the Space Life Sciences Lab overhang the intersection."

Pauletta McGinnis, property disposal officer at Ransom Road, will be handling the disposition paperwork.

"The canisters were prescreened through NASA Headquarters as possible artifacts, but their sheer size makes them difficult to transport to locations off the center," McGinnis said.

Canister No. 2, the last canister enlisted to serve the Space Shuttle Program, rolled out of the CRF on June 17, 2011, to deliver the Raffaello multi-purpose logistics module to Launch Pad 39A for space shuttle Atlantis' final mission, STS-135.

Bill Dowdell, deputy director for International Space Station and Spacecraft Processing, explained: "For us in payloads processing, rolling out of the CRF was the equivalent of launch. Our 'launch' to the pad normally took place about a month before the shuttle's launch. Weather briefings by the 45th Space Wing Weather Office were important in determining when we could start the move."

Jim Burnett, manager of mechanical engineering for Boeing, elaborated: "Those briefings turned those of us on Boeing's canister engineering team into amateur meteorologists. Typically, the convoy would start moving around midnight when the weather was apt to be favorable. Once you started, you were committed. It took about four hours to get to the pad and another four hours to hoist the canister into the pad's payload changeout room (PCR)."

"If the transporter were to break down along the way," Burnett continued, "the lightning protection plan was to pull a crane up to the canister. An expensive piece of hardware would be used to protect a mission-critical piece of equipment."

Only once did the weather get the better of the canister crew.

"A strong tropical system moved into the area while the team was attempting to hoist the STS-127 payloads into the PCR in 2009," Burnett said. "Although the system had been forecast, it picked up speed after the convoy departed for the pad. The canister remained at the base of the pad during a torrential rain. Even with all the safeguards in place on the canister, rain penetrated into the protective environment. Although easily mitigated, it reminded the team how important it was to make conservative weather decisions."

The payload canister transporters also may be repurposed for future programs. "Both of the transporters likely will be retained," Swaney said. "Transporter 2 will support the 21st Century group, and Ground Processing is reviewing the potential to keep transporter 1."

Boyd predicted that her future may involve maintaining and coordinating modifications to the transporter to support one of NASA's future programs.

"The canisters could be reconfigured to suit the specific cooling or ammonia detection needs of each payload," Dowdell said "or could be ultra clean to support payloads like the Hubble Space Telescope. They served Kennedy Space Center well and were real workhorses for NASA's shuttle and station programs."

Federal and state agencies now will be given the opportunity to screen the payload canisters for potential use before a final decision is made on their disposition. In all likelihood, the canisters will be cut into pieces and sold for scrap metal.

From **ALTA**, Page 6

in the same working envelope.

It also gave workers who have not dealt with the pods before a chance to practice and refine the process, Pannullo said. It takes about three days to install the ALTA pods.

The ALTA pods are replicas of the orbital maneuvering system pods, or OMS pods, that shuttle used to steer in space.

Although designed for Enterprise, which never went into orbit, the ALTA pods were used on all the shuttles when they were flown on the back of a modified 747 from Florida to the shuttle's factory in Palmdale, Calif., for periodic overhaul.

They were last used in 2001 when Columbia was brought back from the West Coast to Kennedy, Pannullo said.

The shuttles that flew into orbit during the 30-year program will be displayed with the operational pods they used, although those pods will have been drained of toxic residue and other potential hazards before they are put on display.

Discovery will take the place of Enterprise at the Smithsonian. Endeavour will go to the California Science Center in Los Angeles and Atlantis will be displayed at the Kennedy Space Center Visitor Complex.

Moving the spacecraft safely has been an intense focus for the shuttle team since each is a priceless artifact of space travel. Earlier this year, for instance, teams rehearsed at Kennedy to lift the shuttles off their ferry aircraft without using the specialized structures available at the Shuttle Landing Facility.

Looking up and ahead . . .

*** All times are Eastern**

2011

Oct. 25	Launch/VAFB, SLC-2W: Delta II, NPP; Launch window: 5:48:01 to 5:57:11 a.m. EDT
No Earlier Than Nov. 7	Launch/CCAFS: Delta IV, WGS 4; Launch window: TBD
Nov. 25	Launch/CCAFS: Atlas V, Mars Science Laboratory; Launch: 10:21 a.m. EST
No Earlier Than Nov. 30	Launch/CCAFS: SpaceX Falcon 9, Dragon C2/C3; Launch window: TBD
No Earlier Than December	Launch/Wallops Flight Facility, Pad 0A: Orbital Sciences Corporation, Taurus II, Launch window: TBD

2012

Early 2012	Launch/CCAFS: Atlas V, AEHF 2; Launch window: TBD
Early 2012	Launch/CCAFS: Delta IV-Heavy, NROL-15; Launch window: TBD
No Earlier Than February	Launch/Wallops Flight Facility, Pad 0A: Orbital Sciences Corporation, Cygnus/Taurus II, Launch window: TBD
Feb. 3	Launch/Kwajalein Atoll: Pegasus XL, NuSTAR; Launch window: TBD

Kennedy Space Center Activities

2011 KSC Fall Flag Football League Standings and Upcoming Schedule

TEAM	RECORD	POINTS SCORED	POINTS ALLOWED
Predators	3-0	83	10
Dog and Bone Crushers	2-1	70	25
Stuffers	2-1	51	46
Rowdies	1-2	36	48
Team Ram Rod	1-2	22	68
Bacalao	0-3	6	71

Week 3 Results (Sept. 27)
Ram Rod 16, Bacalao 0
Predators 21, Rowdies 0
Crushers 26, Stuffers 7

Week 4 Schedule (Oct. 4)
5:30 p.m. - Stuffers@ Bacalao
6:30 p.m. - Crushers @ Predators
7:30 p.m. - Ram Rod @ Rowdies

Games are played Tuesdays at KARS Park I. For more information, contact Matt Jimeniz at 321-867-4509 or **matthew.j.jimeniz@nasa.gov**.

2011 KSC Tennis League Rankings, Leaders and Upcoming Schedule

Singles

Group 1 Rankings	Group 2 Rankings	Group 3 Rankings	Group 4 Rankings	Sept. 29 Schedule
Norm Hosan	Ken Young	Kevin Panik	Jorge Rivera	Hosan vs. Wheeler
Calvert Staubus	Miguel Rodriguez	Ed Bertot	Laura Scott	Staubus vs. Specht
Billy Specht	Bob Ingram	Scott DeWitt	Lashelle McCoy	Young vs. Shutt
Alan Wheeler	Art Shutt	Kate Liu	Teresa Bolig	Rodriguez vs. Ingram
				Panik vs. Liu
				Bertot vs. DeWitt
				Rivera vs. Bolig
				Scott vs. McCoy

The league seeks new players and is open to all Kennedy civil service and contractor personnel and dependents. Matches are played Thursdays at KARS Park I and II. For more information, contact Alan Wheeler at 321-867-3565 or **alan.j.wheeler@nasa.gov**.

Doubles

COURT LEADERS FROM SEPT. 27

Court 9 - Art Shutt	Court 7 - Teresa Bolig	Court 4 - Pat Hadden	Court 2 - TBD
Court 8 - Scott Schilling	Court 6 - Jeff Andress	Court 3 - TBD	Court 1 - TBD

COURT GROUPS FOR OCT. 4

Court 9	Court 8	Court 7	Court 6
Chip Hooper	Miguel Rodriguez	Ray Jones	Norm Ring
Scott Schilling	Ron Feile	Jay Hebert	Pat Hadden
Art Shutt	Jeff Andress	Ted Moore	Amy Lombardo
Dave Davies	Teresa Bolig	Tom Li	Alan Wheeler
Court 4	**Court 3**		
Kate Liu	Laura Rochester	**Court 2**	**Court 1**
Diane Porter		TBD	TBD
Laura Scott			
Jane Mosconi			

The league seeks new players and is open to all Kennedy civil service and contractor personnel and dependents. Matches are played Tuesdays at KARS Park I and II. For more information, contact Teresa Bollig at 321-264-8575 or **teresa.e.bollig@nasa.gov**.

John F. Kennedy Space Center

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